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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,368	02/10/2004	David A. Pensak	21016-00002	9526

28534 7590 09/11/2007
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EXAMINER

STEELMAN, MARY J

ART UNIT	PAPER NUMBER
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2191

MAIL DATE	DELIVERY MODE
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09/11/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/774,368

Applicant(s)

PENSAK ET AL.

Examiner

MARY STEELMAN

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-19 and 21-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1,2,4-19,21-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action is in response to Claim Amendments and Remarks received 06/20/2007. Per Applicant's request, claims 1, 4, 5, 7, 10, 11, 12-19, and 21-24 are amended. Claims 3 and 20 are cancelled. Claims 1, 2, 4-19, and 21-25 are pending.

Drawings

2. Replacement sheet FIG. 1 has been entered.

Claim Objections

3. In view of the amendments to claims 7, 13, 14, and 22, the prior objections are hereby withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 does not clearly present that it is the second electronic execution environment subsection(s) that are modified to cause a transfer of execution control. Consider rewording

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preamble, as program is not configured to execute within a first electronic execution environment. (Some segments are encrypted and will only execute in a second environment.) Considering the use 'steps' in dependent claims, 'steps' in the preamble provide antecedent basis.

Suggested claim language:

A process for modifying a application computer program [that is configured to execute within a first electronic execution environment], said process steps comprising:

incorporating into said application computer program an execution controller that is configured to launch concurrently with said application computer program, said execution controller to execute as a debugger within a second electronic execution environment different from a first electronic execution environment;

identifying boundaries of said first electronic execution environment and said second electronic execution environment subsections of said application computer program; and

modifying said (one or more?) second electronic execution environment subsection, so that upon encountering said second electronic execution environment subsection, when executing in said first electronic environment, execution control transfers to said execution controller for execution of said second electronic execution environment subsection.

Claim Rejections - 35 USC § 101

6. In view of the amendments to claims 12 and 19, the prior 35 U.S.C. 101 rejections are hereby withdrawn.

Response to Arguments

7. Applicant's arguments filed have been fully considered but they are not persuasive.

Applicant has argued, in substance, the following:

(A) Regarding independent claim 1, as noted on page 12, 2nd paragraph of Remarks, Horning does not disclose “an execution controller that is configured to execute as a debugger” or “causing a transfer of execution control to said execution controller.” In contrast a specific function of Horning is to prevent an application computer program from executing under a debugger.

Examiner's Response:

It seems that the Horning reference and Applicant's use of the term 'debugger' is used in different ways.

Microsoft Dictionary Fifth Edition (2002), debugger, page 148: A program designed to aid in debugging another program by allowing the programmer to step through the program, examine the data, and monitor conditions such as the values of variables.

Paragraphs (Horning: [0086], [0087], [0226]) pointed to by Applicant, disclose that Horning desired to provide code that would prevent dynamic analysis of code such as an attacker may try using a debugger. (In this sense, an attacker using a debug tool to pick apart the code to determine code sequences or values.)

Applicant's Specification discloses, [0006], "The Execution Controller interacts with the operating system as a debugger and controls the execution of the application. Execution control is transferred to a debugger/decryption routine (hereafter called an Execution Controller) when the operating system detects an illegal address, instruction, or modified opcode in a protected executable file."

Thus, Applicant's use of the term 'debugger' is a 'decrypter' of modified opcode, controlled by the Execution Controller. Applicant's term 'debugger' is used to convey a tool that Execution Controller uses to control execution of the application.

Applicant recites at [0034] that the functions of the Execution Control 40 will be described more fully below. [0035-0045], The Execution Controller attaches to the main process, may obtain key indices / identifiers from headers, retrieve corresponding cipher-text (second electronic execution environment), authenticates/ verifies, decrypts and enables main process to resume execution.

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Analogously to Horning (at Horning [0226]), Applicant disclosed, [0007] The Execution Controller has its own code for managing decryption and tamper protection. The Execution Controller also prevents the user from loading his own instantiation of a debugger to take control of the application. The execution Controller detects whether there have been any attempts to tamper with the protected executable and responds to tampering.

Although the above functions are generally summarized, they represent the interaction with the operating system by the Execution Controller using a 'debugger' tool during program execution.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1-25 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent

Application Publication 2005/0204348 A1 to Horning et al

Per claim 1:

A process for modifying an application computer program that is configured to execute within a first electronic execution environment, said process comprising:

-incorporating into said application computer program an execution controller that is configured to execute as a debugger within a second electronic execution environment different from said first electronic execution environment;

-identifying boundaries of a subsection of said application computer program;

-modifying said subsection of said application computer program to a form which, when executed within the first electronic execution environment, causes a transfer of execution control to said execution controller.

Horning: [0071-0072], obfuscation transformations to a target program procedures or modules [0090-0099], binary modification tools, identify basic blocks, procedures, insert instructions before and / or after other identified instructions, rewrite and / or modify, insert new functions...

Horning: [0081], obfuscated program will typically be functionally equivalent to the original program Horning: [0087], A variety of tools and techniques can be used to perform obfuscating transformation on a target computer program. [0594], provide internal tracing and debugging features.

Per claim 2:

-wherein a boundary of said subsection is a flow control instruction.

Horning: [0092-0094], basic blocks, procedures

Per claim 4:

-modifying said subsection of said application computer program includes a step of adding an instruction that causes a transfer of execution control to said execution controller.

Horning: [0072], a software self defense control program...including...obfuscation transformations...to a target program; procedures or modules for adding tamper resistance measures to target program; and / or procedures or modules for applying watermarks...[0594], Provide internal tracing and debugging features...for generating (encrypted) trace and debugging messages...will support failure diagnosis...

Per claim 5:

-modifying said subsection of said application computer program includes a step of encrypting at least a portion of said subsection of said application computer program.

Horning: [0073], cryptographic keys, encryption and decryption... [0096], ability to rewrite and / or modify existing instructions [0116], by encrypting the program's code

Per claim 6;

-modifying said subsection of said application computer program further includes a step of relocating at least a portion of said encrypted portion of said subsection to a location distinct from the location of the corresponding unmodified subsection of said application computer program.

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Horning: [0081], obfuscated program may demonstrate different space and time behavior [0099], ability to update other program sections such as the relocation information [0254], encrypting code sequences and inserting calls to, e.g., a support function that decrypts those code sequences prior to execution [0376], move pieces of code

Per claim 7:

-modifying said subsection of said application computer program includes a step of adding functionality for the execution controller to communicate with a remote process, wherein the remote process does not execute within either the first or second execution environments.

Horning: [0531-0533], External agents can send a key ...tell it to calculate the MAC value for the appropriate code region...Agent compares received MAC value...If the MAC values match then the SDP (self defense program) is deemed valid

Per claim 8:

-said remote process is a process that authorizes continued execution of the application computer program.

Horning: [0532], deemed valid

Per claim 9:

-said remote process is a cryptographic key management process.

Horning: [0531-0533], sending keys

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Per claim 10:

-said execution controller communicates information about execution of said computer application program.

Horning: [0483-0484], [0490], suspected tampering should be reported externally for fraud detection...connect to an external site...external tamper monitoring agent.

Per claim 11:

-said information is information about tampering with said application computer program.

Horning: [0483-0484], [0490], suspected tampering should be reported externally for fraud detection...connect to an external site...external tamper monitoring agent.

Per claim 12:

An apparatus for executing an application computer program, comprised of:

a computer with an operating system;

an application computer program having an executable portion in a form that can be executed in a first execution environment under the control of the operating system and a non-executable portion in a non-executable form; and

an execution controller in a form that can be executed as a debugger in a second execution environment under the control of the operating system, said second execution environment distinct from said first execution environment, and wherein said execution controller converts the non-executable portion of the application computer program into a form that can be executed in

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the first execution environment.

Horning: See rejection of limitations as addressed in claim 1 above. Also, [0073],

Convert encrypted portion into a form that can be executed.

Per claim 13:

-the non-executable portion of the application computer program includes an encrypted portion.

Horning: [0073]

Per claim 14:

-the application computer program includes a portion capable of communicating with a remote process not within either the operating system or the execution controller.

See rejection of limitations addressed in claim 7 above.

Per claim 15:

-the first remote process is a process that authorizes continued execution of the application computer program.

Horning: [0519], external site can inspect the watchdogs [0531], external agents force an DSP to prove its own validity using keys

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Per claim 16:

-the first remote process is a cryptographic key management process.

See rejection of limitations addressed in claim 9 above.

Per claim 17:

-the execution controller communicates information about execution of said application computer program to a second remote process, wherein the second remote process does not execute within the first execution environment or the second execution environment.

Horning: [0483-0484], [0490], suspected tampering should be reported externally for fraud detection...connect to an external site...external tamper monitoring agent.

Per claim 18:

-the information about execution of said application computer program is information about tampering with the application computer program.

See rejection of claim 11 above.

Per claim 19:

A process for executing a computer application program, comprising the steps of:

-launching an operating system;

-launching an application computer program, said application computer program having an executable portion in a form that can be executed in a first execution environment under the control of the operating system and a non-executable portion in a non-executable form;

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- launching an execution controller, said execution controller in a form that can be executed as a debugger in a second execution environment distinct from the first execution environment;
- using the execution controller to convert the non-executable portion of the application computer program to an executable form;
- executing the application computer program within the first execution environment.

See rejection of limitations addressed in claim 12 above.

Per claim 21:

- the non-executable portion of the application computer program is in encrypted form.

See rejection of limitations addressed in claim 13 above.

Per claim 22:

- the execution controller communicates with a first remote process, wherein the first remote process does not execute under the control of either the application computer program or the execution controller.

See rejection of limitations addressed in claim 7 above.

Per claim 23:

- the first remote process is part of a cryptographic key management process.

See rejection of limitations addressed in claim 16 above.

Per claim 24:

-the execution controller communicates information about execution of the application computer program to a second remote process, wherein the second remote process does not execute within the first execution environment or the second execution environment.

See rejection of limitations addressed in claim 17 above.

Per claim 25:

-the information is information about tampering with the application computer program.

See rejection of limitations addressed in claims 11 & 18 above.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

USPN 6,701,439 B1 to Dunn

In the case of a suspected hacker or intrusion by an unauthorized entity, the fraud detection and nuisance reporting features 40 of the telecommunications switch 30 are employed to impede, discourage, and/or surveil the unauthorized entity. Ultimately, the hacker may be prosecuted under the wire fraud or harassment laws.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Steelman, whose telephone number is (571) 272-3704. The examiner can normally be reached Monday through Thursday, from 7:00 AM to 5:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wei Zhen can be reached at (571) 272-3708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mary Steelman

08/29/2007

MARY STEELMAN
PRIMARY EXAMINER

A handwritten signature in black ink, appearing to read 'Mary Steelman', written in a cursive style.